FIG. 1

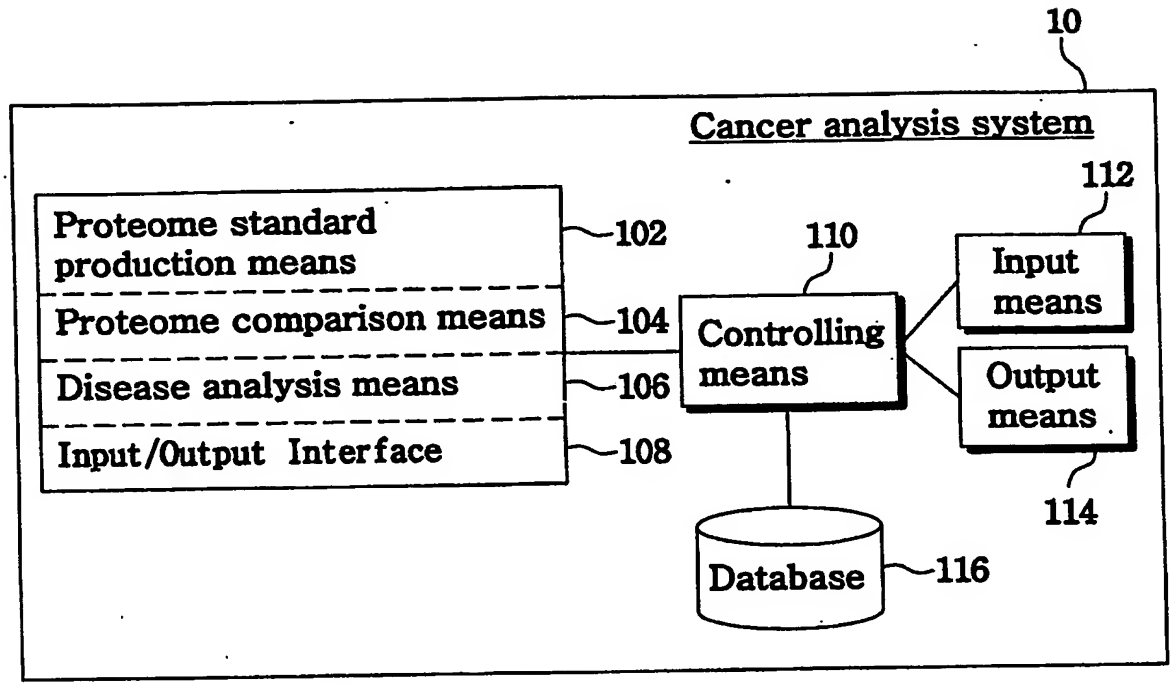

10
Cancer analysis system
Proteome standard production means
102
Proteome comparison means
104
Disease analysis means
106
Input/Output Interface
108
110
Controlling means
112
Input means
Output means
114
Database
116

FIG. 2

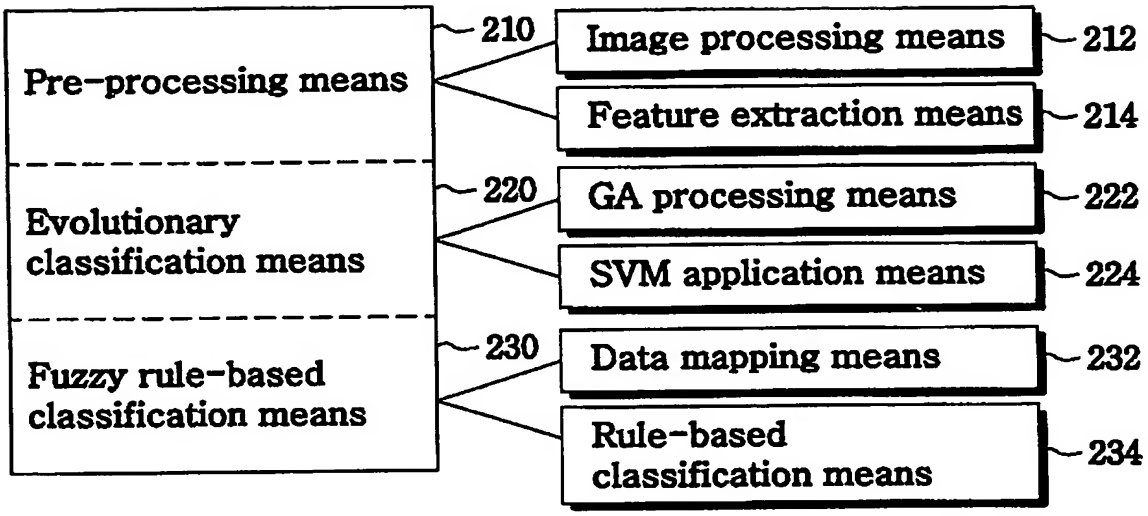

Pre-processing means
210
Image processing means
212
Feature extraction means
214
Evolutionary classification means
220
GA processing means
222
SVM application means
224
Fuzzy rule-based classification means
230
Data mapping means
232
Rule-based classification means
234

FIG. 3

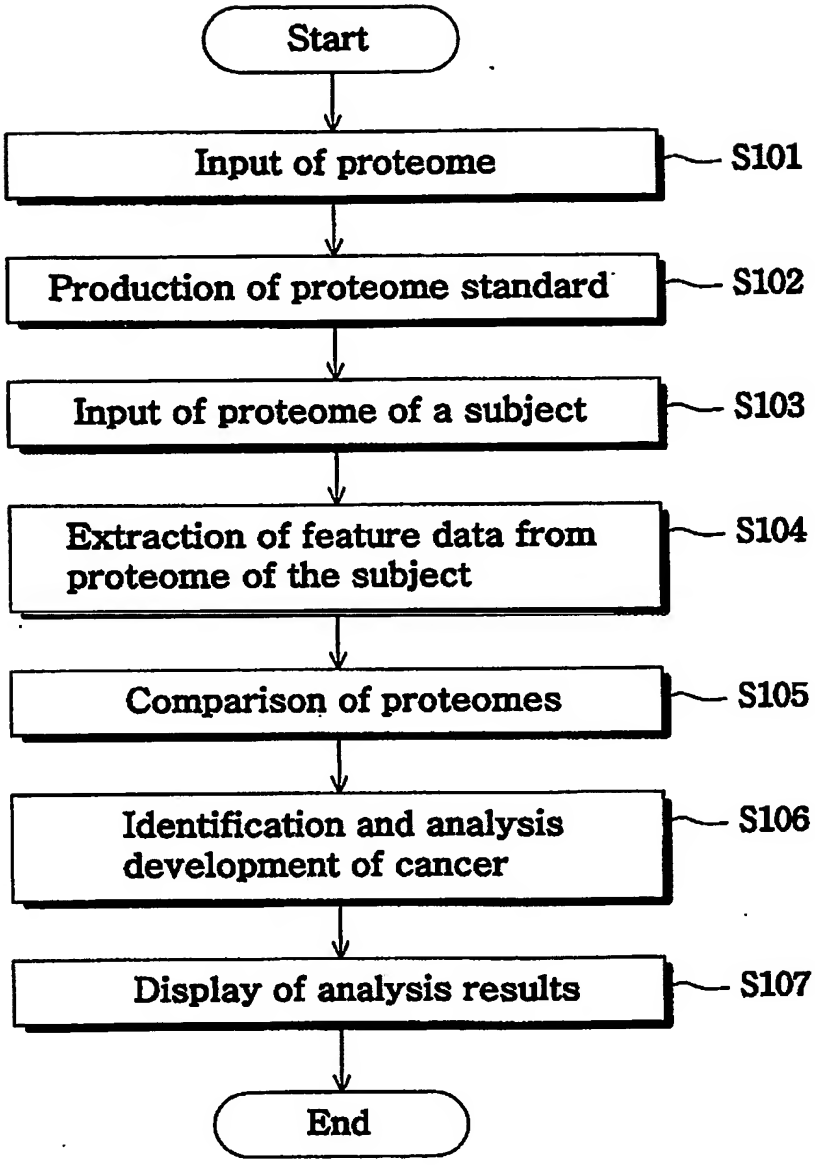

Start
Input of proteome
S101
Production of proteome standard
S102
Input of proteome of a subject
S103
Extraction of feature data from proteome of the subject
S104
Comparison of proteomes
S105
Identification and analysis development of cancer
S106
Display of analysis results
S107
End

FIG. 4

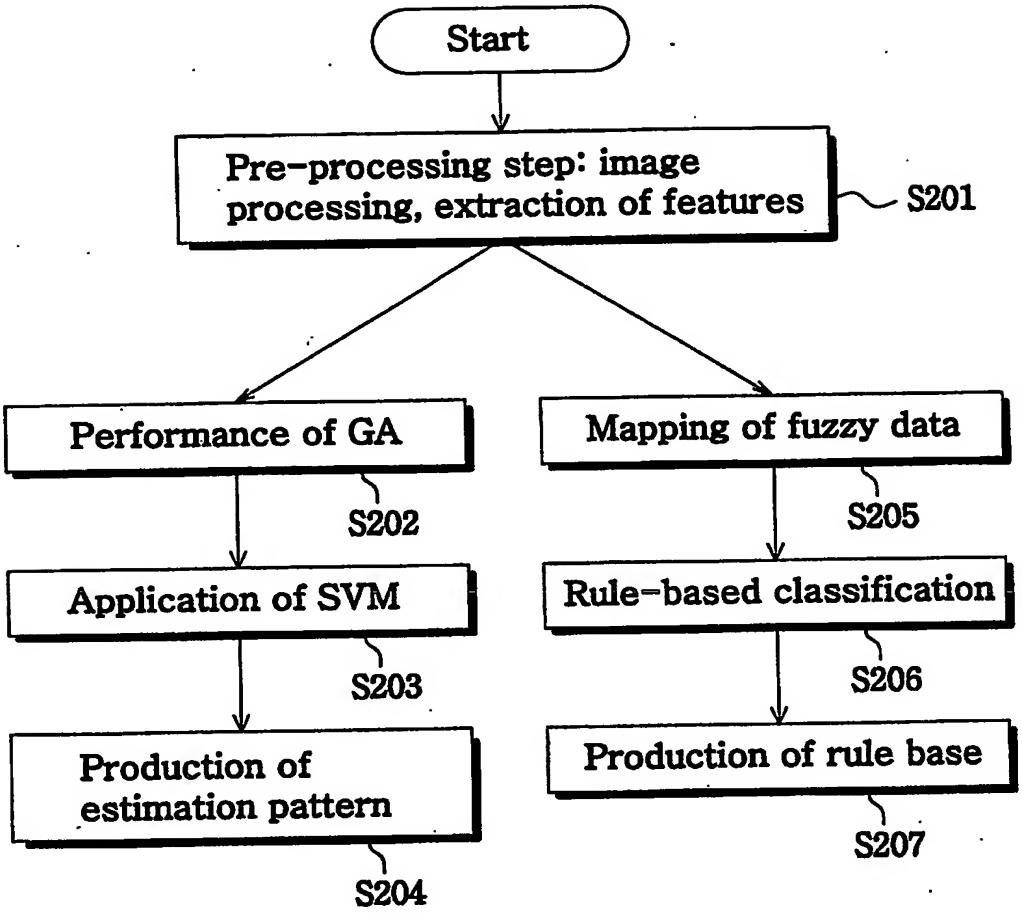
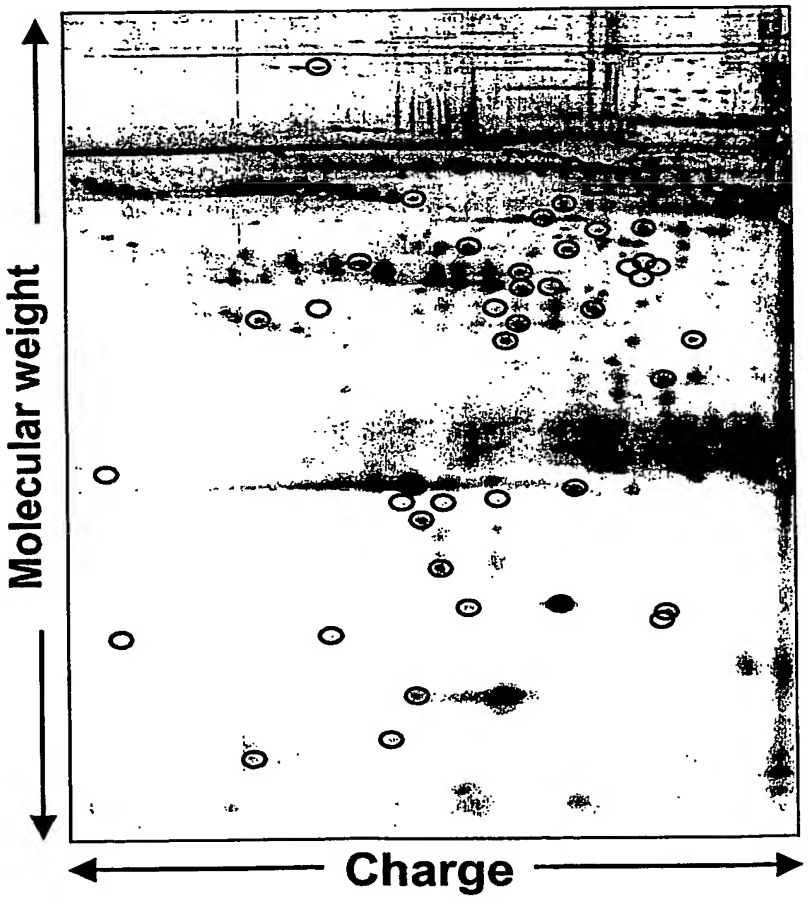


FIG. 5

Serum proteome image



6/15

FIG. 6

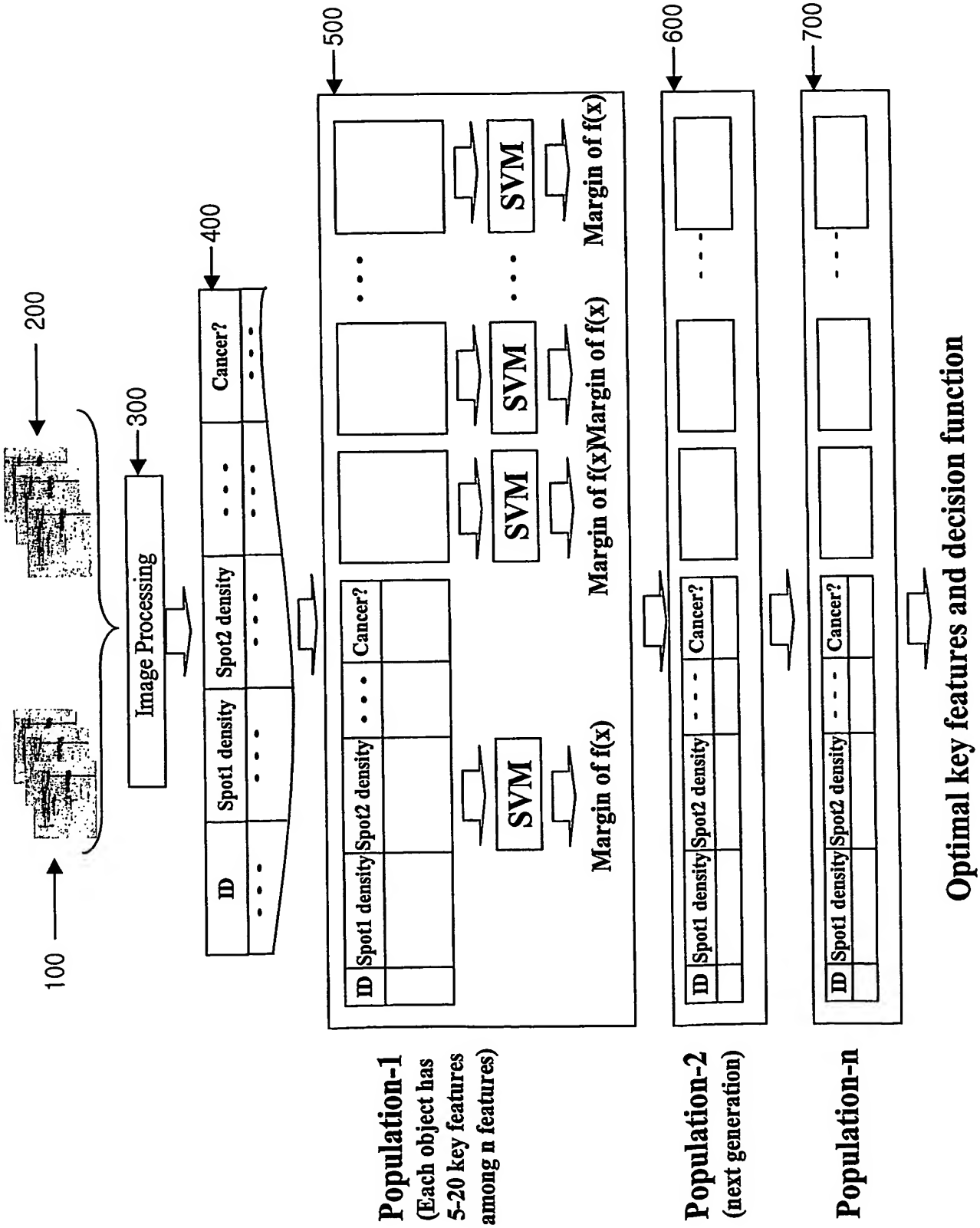

100
200
300
Image Processing
400
ID
Spot1 density
Spot2 density
Cancer?
500
SVM
Margin of f(x)
Population-1
(Each object has 5-20 key features among n features)
600
Population-2
(next generation)
700
Population-n
Optimal key features and decision function

FIG. 7

Support Vector Machine

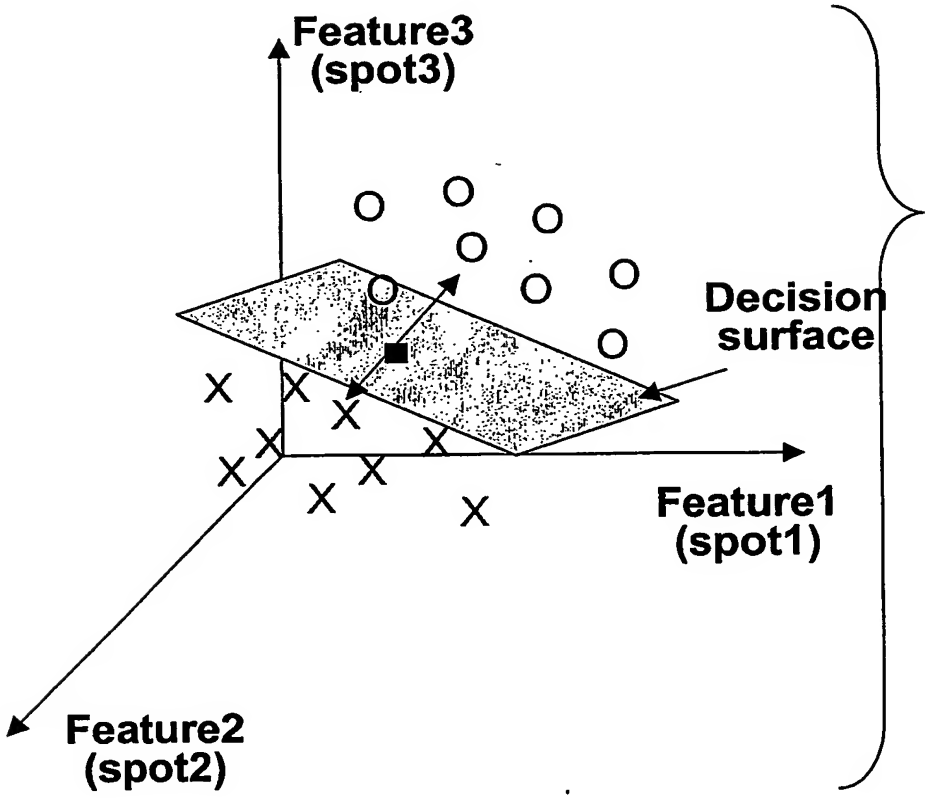


FIG. 8A

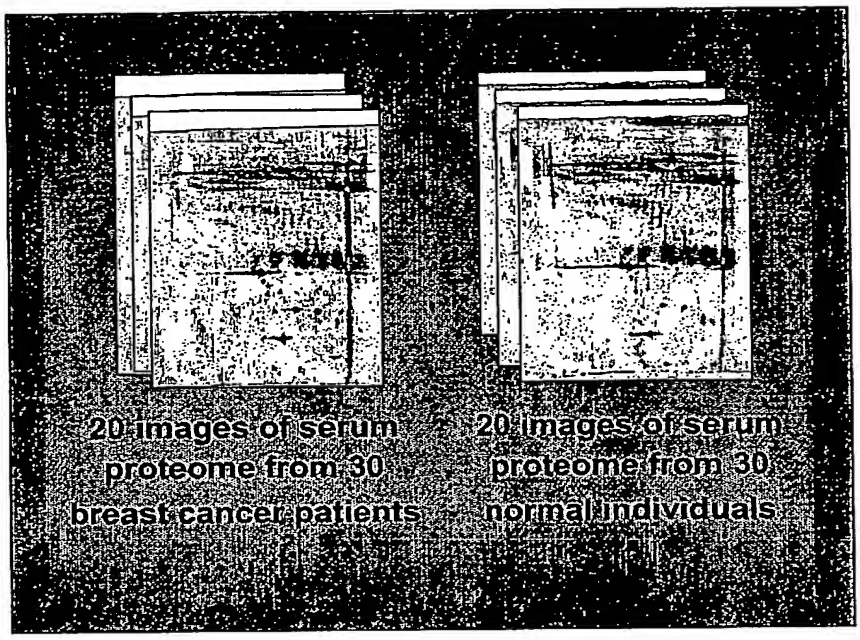
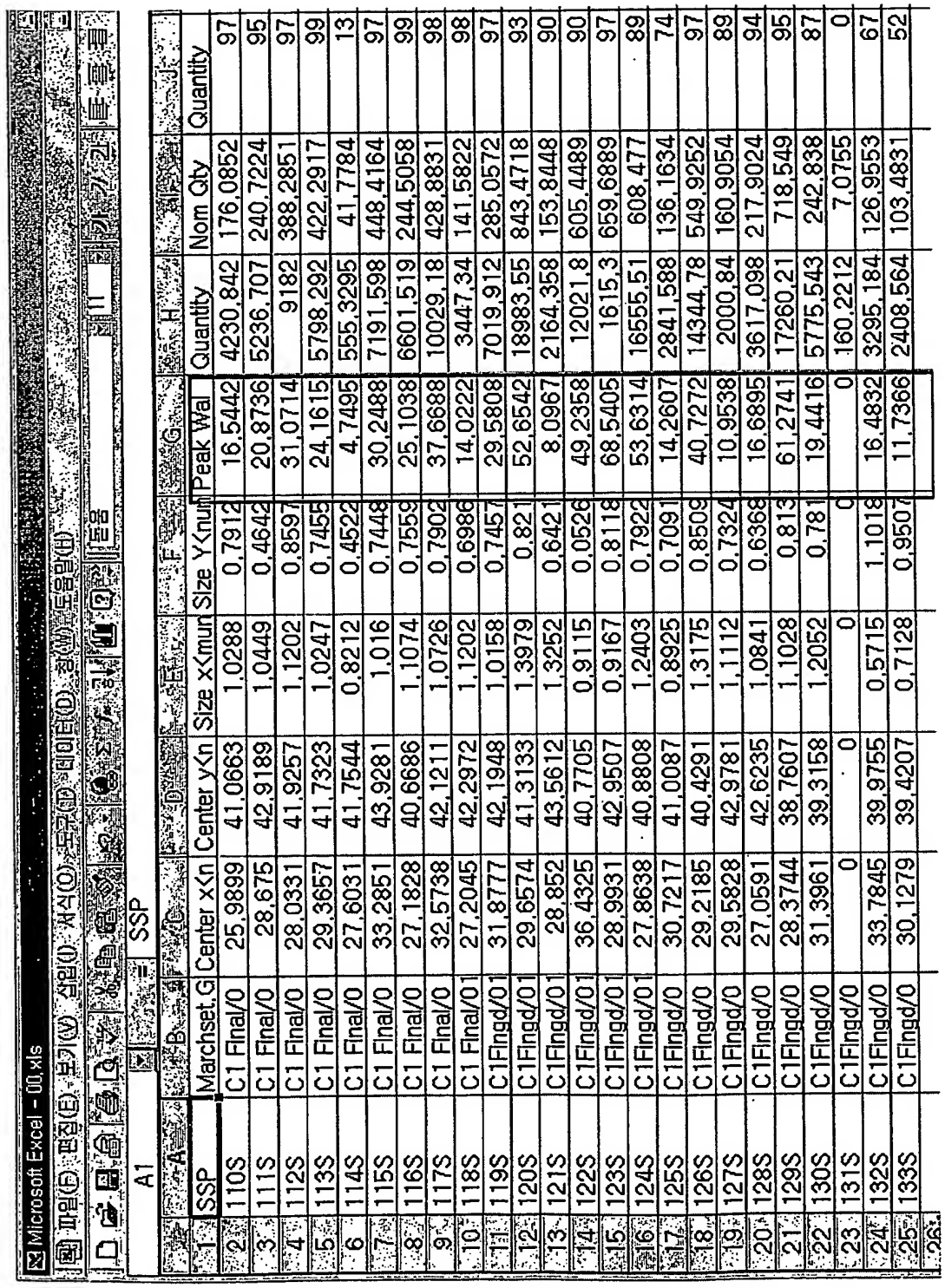

20 images of serum proteome from 30 breast cancer patients
20 images of serum proteome from 30 normal individuals

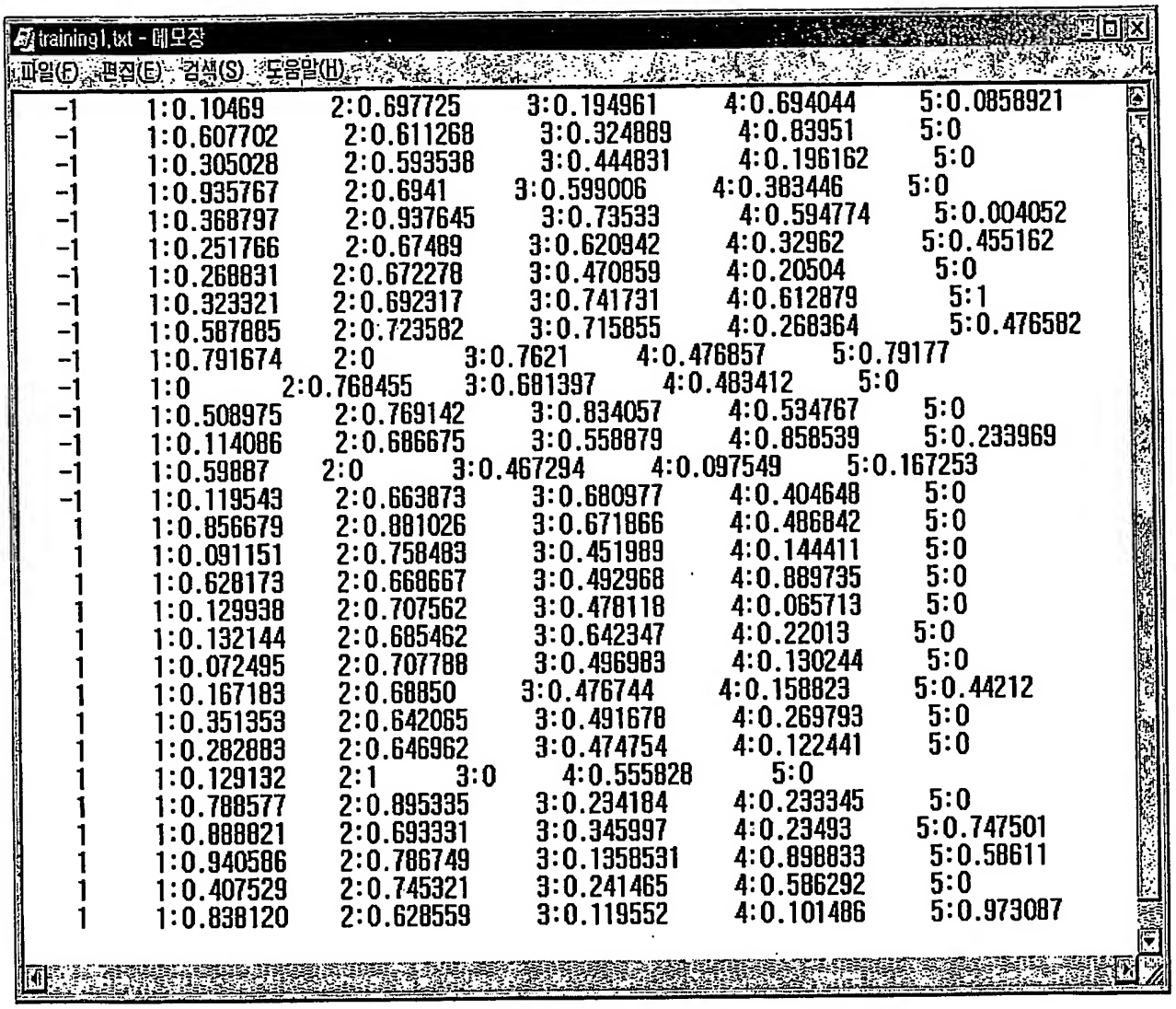
FIG. 8B



	A	B	C	D	E	F	G	H	I	J
1	SSP	Marchset.G	Center x<n	Center y<n	Size x<mun	Size Y<num	Peak Wal	Quantity	Nom Qty	Quantity
2	110S	C1 Final/0	25,9899	41,0663	1,0288	0,7912	16,5442	4230,842	176,0852	97
3	111S	C1 Final/0	28,675	42,9189	1,0449	0,4642	20,8736	5236,707	240,7224	95
4	112S	C1 Final/0	28,0331	41,9257	1,1202	0,8597	31,0714	9182	388,2851	97
5	113S	C1 Final/0	29,3657	41,7323	1,0247	0,7455	24,1615	5798,292	422,2917	99
6	114S	C1 Final/0	27,6031	41,7544	0,8212	0,4522	4,7495	555,3295	41,7784	13
7	115S	C1 Final/0	33,2851	43,9281	1,016	0,7448	30,2488	7191,598	448,4164	97
8	116S	C1 Final/0	27,1828	40,6686	1,1074	0,7559	25,1038	6601,519	244,5058	99
9	117S	C1 Final/0	32,5738	42,1211	1,0726	0,7902	37,6688	10029,18	428,8831	98
10	118S	C1 Final/01	27,2045	42,2972	1,1202	0,6986	14,0222	3447,34	141,5822	98
11	119S	C1Fingd/01	31,8777	42,1948	1,0158	0,7457	29,5808	7019,912	285,0572	97
12	120S	C1Fingd/01	29,6574	41,3133	1,3979	0,821	52,6542	18983,55	843,4718	93
13	121S	C1Fingd/01	28,852	43,5612	1,3252	0,6421	8,0967	2164,358	153,8448	90
14	122S	C1Fingd/01	36,4325	40,7705	0,9115	0,0526	49,2358	12021,8	605,4489	90
15	123S	C1Fingd/01	28,9931	42,9507	0,9167	0,8118	68,5405	1615,3	659,6889	97
16	124S	C1Fingd/01	27,8638	40,8808	1,2403	0,7922	53,6314	16555,51	608,477	89
17	125S	C1Fingd/0	30,7217	41,0087	0,8925	0,7091	14,2607	2841,588	136,1634	74
18	126S	C1Fingd/0	29,2185	40,4291	1,3175	0,8509	40,7272	14344,78	549,9252	97
19	127S	C1Fingd/0	29,5828	42,9781	1,1112	0,7324	10,9538	2000,84	160,9054	89
20	128S	C1Fingd/0	27,0591	42,6235	1,0841	0,6368	16,6895	3617,098	217,9024	94
21	129S	C1Fingd/0	28,3744	38,7607	1,1028	0,813	61,2741	17260,21	718,549	95
22	130S	C1Fingd/0	31,3961	39,3158	1,2052	0,781	19,4416	5775,543	242,838	87
23	131S	C1Fingd/0	0	0	0	0	0	160,2212	7,0755	0
24	132S	C1Fingd/0	33,7845	39,9755	0,5715	1,1018	16,4832	3295,184	126,9553	67
25	133S	C1Fingd/0	30,1279	39,4207	0,7128	0,9507	11,7366	2408,564	103,4831	52
26										

Spot information as a result of analysis of 2D images

FIG. 8C



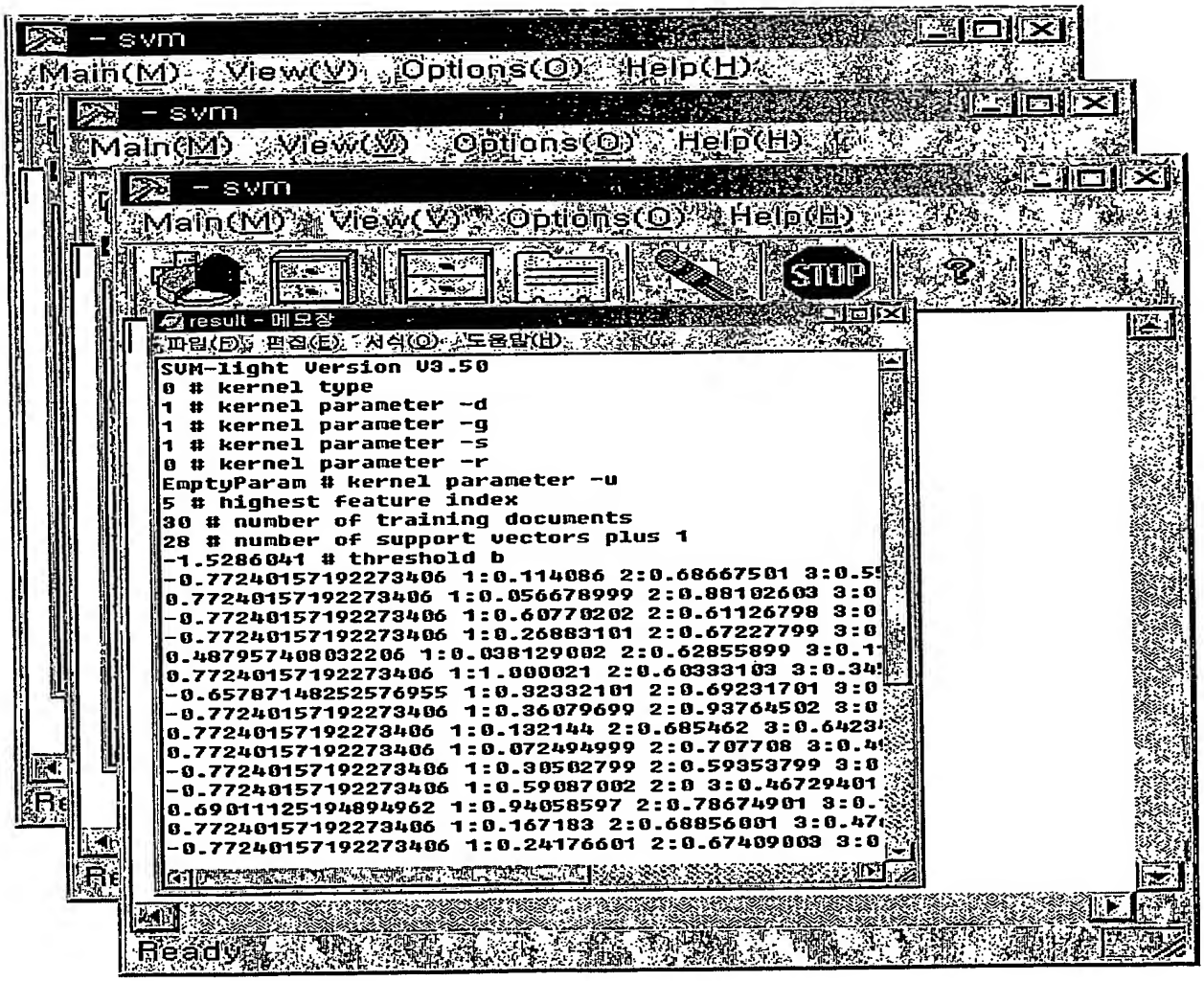
training1.txt - 메모장

파일(F) 편집(E) 검색(S) 도움말(H)

```
-1  1:0.10469  2:0.697725  3:0.194961  4:0.694044  5:0.0858921
-1  1:0.607702  2:0.611268  3:0.324889  4:0.83951  5:0
-1  1:0.305028  2:0.593538  3:0.444831  4:0.196162  5:0
-1  1:0.935767  2:0.6941  3:0.599006  4:0.383446  5:0
-1  1:0.368797  2:0.937645  3:0.73533  4:0.594774  5:0.004052
-1  1:0.251766  2:0.67489  3:0.620942  4:0.32962  5:0.455162
-1  1:0.268831  2:0.672278  3:0.470859  4:0.20504  5:0
-1  1:0.323321  2:0.692317  3:0.741731  4:0.612879  5:1
-1  1:0.587885  2:0.723582  3:0.715855  4:0.268364  5:0.476582
-1  1:0.791674  2:0  3:0.7621  4:0.476857  5:0.79177
-1  1:0  2:0.768455  3:0.681397  4:0.483412  5:0
-1  1:0.508975  2:0.769142  3:0.834057  4:0.534767  5:0
-1  1:0.114086  2:0.686675  3:0.558879  4:0.858539  5:0.233969
-1  1:0.59887  2:0  3:0.467294  4:0.097549  5:0.167253
-1  1:0.119543  2:0.663873  3:0.680977  4:0.404648  5:0
 1  1:0.856679  2:0.881026  3:0.671866  4:0.486842  5:0
 1  1:0.091151  2:0.758483  3:0.451989  4:0.144411  5:0
 1  1:0.628173  2:0.668667  3:0.492968  4:0.889735  5:0
 1  1:0.129938  2:0.707562  3:0.478118  4:0.065713  5:0
 1  1:0.132144  2:0.685462  3:0.642347  4:0.22013  5:0
 1  1:0.072495  2:0.707788  3:0.496983  4:0.130244  5:0
 1  1:0.167183  2:0.68850  3:0.476744  4:0.158823  5:0.44212
 1  1:0.351353  2:0.642065  3:0.491678  4:0.269793  5:0
 1  1:0.282883  2:0.646962  3:0.474754  4:0.122441  5:0
 1  1:0.129132  2:1  3:0  4:0.555828  5:0
 1  1:0.788577  2:0.895335  3:0.234184  4:0.233345  5:0
 1  1:0.888821  2:0.693331  3:0.345997  4:0.23493  5:0.747501
 1  1:0.940586  2:0.786749  3:0.1358531  4:0.898833  5:0.58611
 1  1:0.407529  2:0.745321  3:0.241465  4:0.586292  5:0
 1  1:0.838120  2:0.628559  3:0.119552  4:0.101486  5:0.973087
```

Processed training set

FIG. 8D



Application of SVM/GA

FIG. 9A

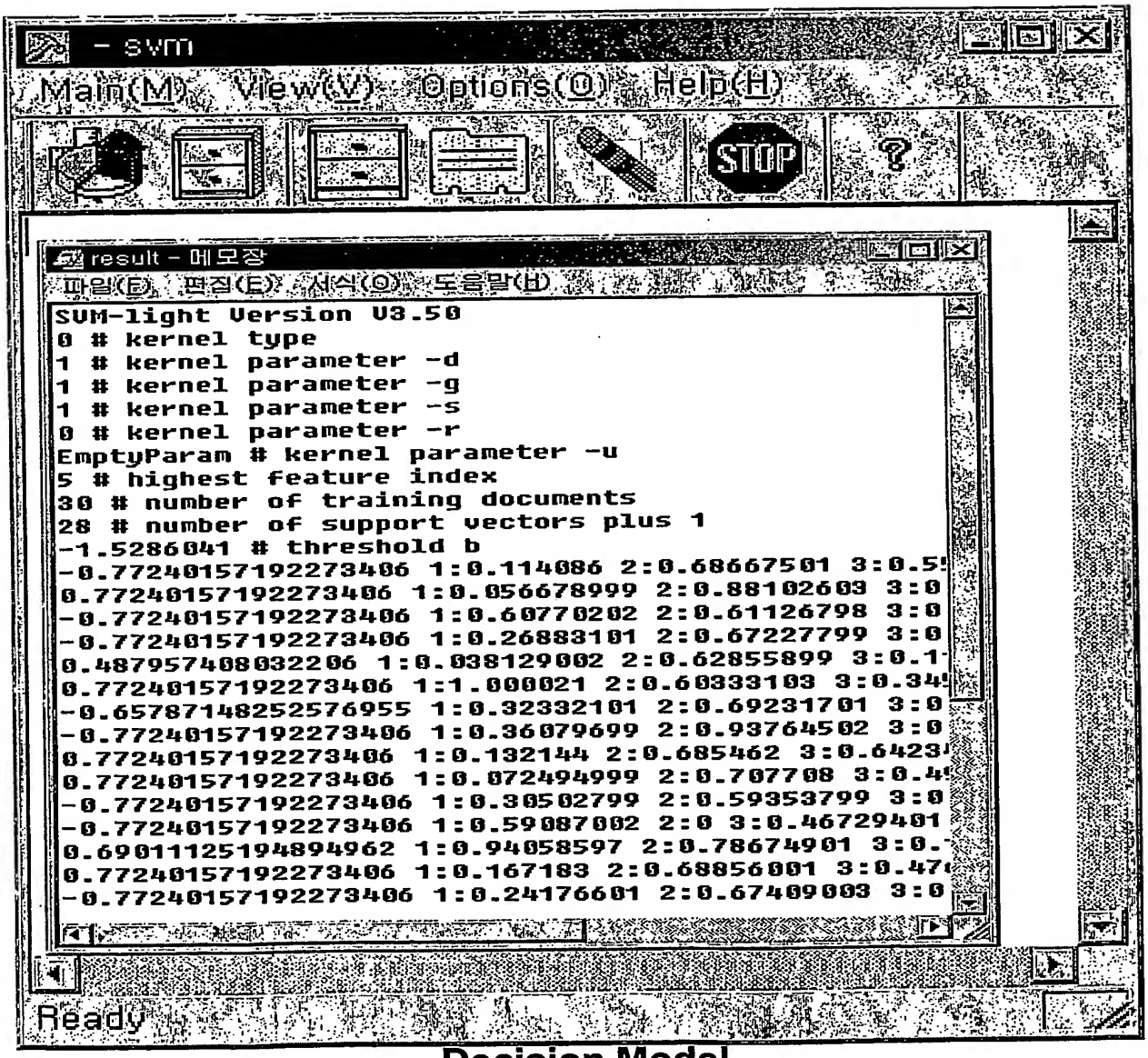
Test Set of individuals (cancer 33, normal 35)

classify1.txt - 메모장

파일(F) 편집(E) 검색(S) 도움말(H)

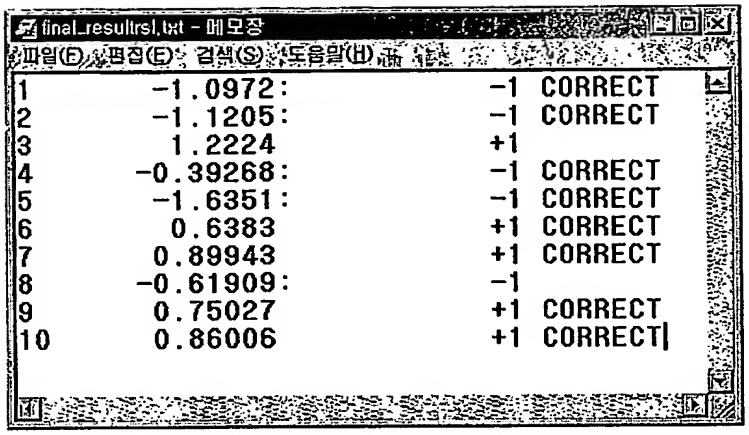
-1	1:0.653996	2:0.856751	3:0.785041	4:0.080331	5:0.142553
-1	1:0.303655	2:0.69068	3:1	4:0.726181	5:0
-1	1:0.08852	2:0.655191	3:0.234804	4:0.14616	5:0
-1	1:0.460967	2:0.621134	3:0.824271	4:0.41638	5:0.02018
-1	1:0.799965	2:0.660263	3:0.827914	4:1	5:0.349266
1	1:0.123412	2:0.95635	3:0.424201	4:0.216259	5:0
1	1:0.317662	2:0.742086	3:0.463054	4:0.092377	5:0
1	1:0.493387	2:0.655585	3:0.828893	4:0.509369	5:0.159146
1	1:0.151278	2:0.860072	3:0.430383	4:0.283809	5:0
1	1:0.112535	2:0.610522	3:0.467818	4:0	5:0.344098

FIG. 9B



Decision Model

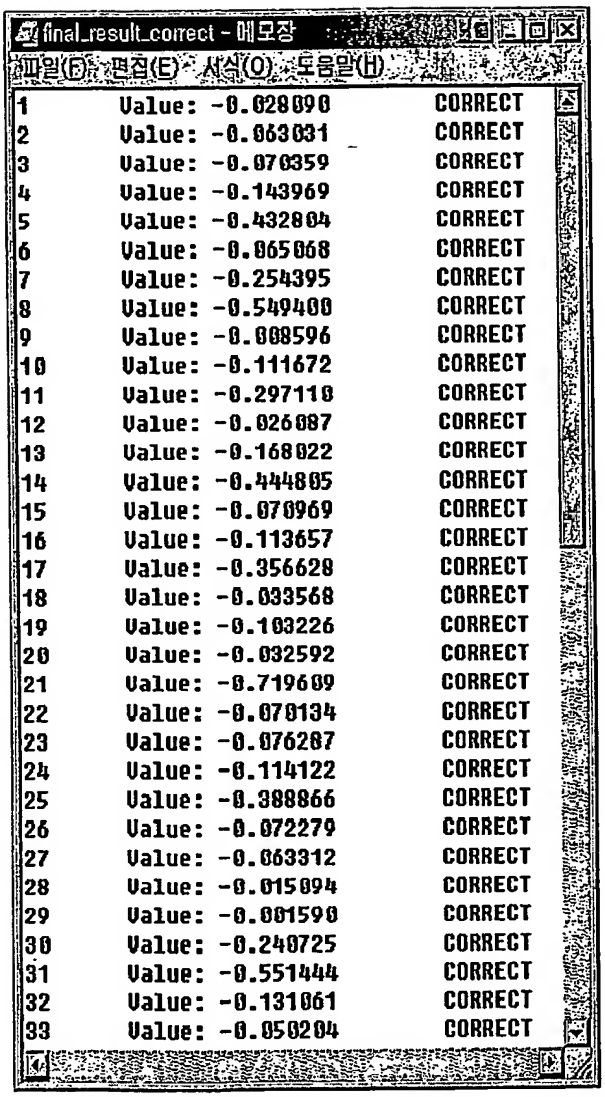
FIG. 9C

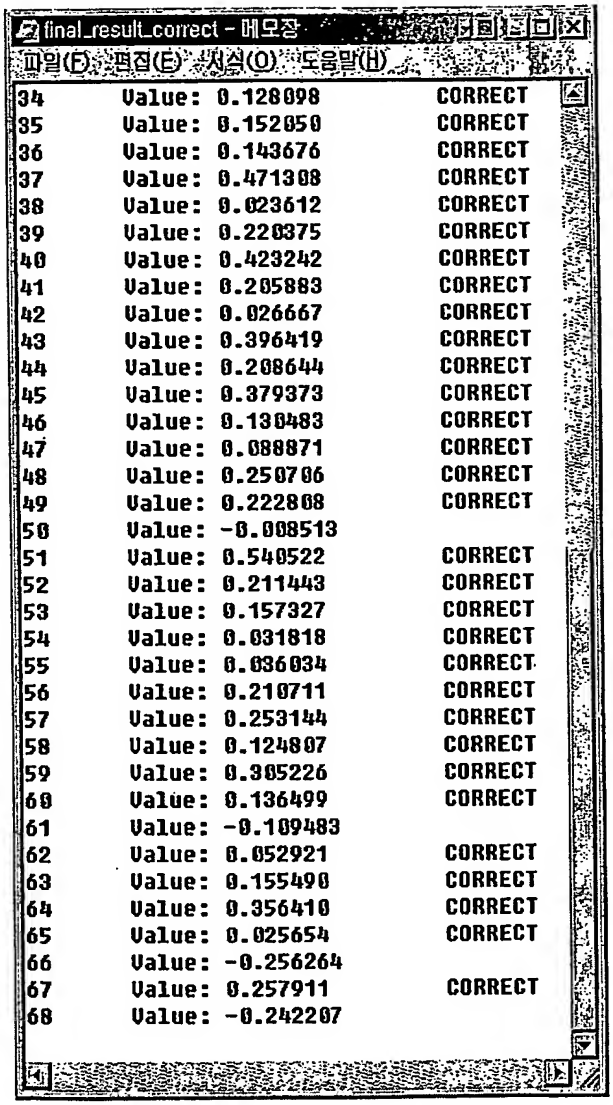


Judgment results

- **Sensitivity → 100%**
- **Specificity → 88.57%**
- **Classification Accuracy → 94.11%**

FIG. 10


final_result_correct - 메모장
파일(F) 편집(E) 서식(O) 도움말(H)
1 Value: -0.028090 CORRECT
2 Value: -0.063031 CORRECT
3 Value: -0.070359 CORRECT
4 Value: -0.143969 CORRECT
5 Value: -0.432804 CORRECT
6 Value: -0.065068 CORRECT
7 Value: -0.254395 CORRECT
8 Value: -0.549400 CORRECT
9 Value: -0.008596 CORRECT
10 Value: -0.111672 CORRECT
11 Value: -0.297110 CORRECT
12 Value: -0.026087 CORRECT
13 Value: -0.168022 CORRECT
14 Value: -0.444805 CORRECT
15 Value: -0.070969 CORRECT
16 Value: -0.113657 CORRECT
17 Value: -0.356628 CORRECT
18 Value: -0.033568 CORRECT
19 Value: -0.103226 CORRECT
20 Value: -0.032592 CORRECT
21 Value: -0.719609 CORRECT
22 Value: -0.070134 CORRECT
23 Value: -0.076287 CORRECT
24 Value: -0.114122 CORRECT
25 Value: -0.388866 CORRECT
26 Value: -0.072279 CORRECT
27 Value: -0.063312 CORRECT
28 Value: -0.015094 CORRECT
29 Value: -0.001590 CORRECT
30 Value: -0.240725 CORRECT
31 Value: -0.551444 CORRECT
32 Value: -0.131061 CORRECT
33 Value: -0.050204 CORRECT


final_result_correct - 메모장
파일(F) 편집(E) 서식(O) 도움말(H)
34 Value: 0.128098 CORRECT
35 Value: 0.152050 CORRECT
36 Value: 0.143676 CORRECT
37 Value: 0.471308 CORRECT
38 Value: 0.023612 CORRECT
39 Value: 0.220375 CORRECT
40 Value: 0.423242 CORRECT
41 Value: 0.205883 CORRECT
42 Value: 0.026667 CORRECT
43 Value: 0.396419 CORRECT
44 Value: 0.208644 CORRECT
45 Value: 0.379373 CORRECT
46 Value: 0.130483 CORRECT
47 Value: 0.088871 CORRECT
48 Value: 0.250706 CORRECT
49 Value: 0.222868 CORRECT
50 Value: -0.008513
51 Value: 0.540522 CORRECT
52 Value: 0.211443 CORRECT
53 Value: 0.157327 CORRECT
54 Value: 0.031818 CORRECT
55 Value: 0.036034 CORRECT
56 Value: 0.210711 CORRECT
57 Value: 0.253144 CORRECT
58 Value: 0.124807 CORRECT
59 Value: 0.385226 CORRECT
60 Value: 0.136499 CORRECT
61 Value: -0.109483
62 Value: 0.052921 CORRECT
63 Value: 0.155490 CORRECT
64 Value: 0.356410 CORRECT
65 Value: 0.025654 CORRECT
66 Value: -0.256264
67 Value: 0.257911 CORRECT
68 Value: -0.242207